SECTION II—CLAIMS

1.-47. (Canceled)

48. (New) An apparatus comprising:

a substrate;

a first sub-grating formed on the substrate, the first sub-grating including a pair of lateral edges and having a first grating period and a first amplitude; and

a second sub-grating formed on the substrate parallel to the first sub-grating and separated from the first sub-grating by a selected distance, wherein the second sub-grating has a second grating period different than the first grating period and a second amplitude different than the first amplitude.

49. (New) The apparatus of claim 48 wherein the selected distance is positive.

50. (New) The apparatus of claim 48 wherein the selected distance is negative, such that the first sub-grating and the second sub-grating overlap.

51. (New) The apparatus of claim 48 wherein the selected distance is zero.

52. (New) The apparatus of claim 48 wherein the substrate is planar.

53. (New) The apparatus of claim 48 wherein the substrate is non-planar.

54. (New) The apparatus of claim 48 wherein the first and second sub-gratings are transmissive gratings.

55. (New) The apparatus of claim 48 wherein the first and second sub-gratings are reflective gratings.

56. (New) An apparatus comprising:

a substrate;

a first sub-grating formed on the substrate, the first sub-grating having a first grating period; and

a second sub-grating formed on the substrate parallel to the first sub-grating and separated from the first sub-grating by a selected non-zero distance, wherein the second sub-grating has a second grating period different than the first grating period.

57. (New) The apparatus of claim 56 wherein the selected non-zero distance is positive.

58. (New) The apparatus of claim 56 wherein the selected non-zero distance is negative, such that the first sub-grating and the second sub-grating overlap.

59. (New) The apparatus of claim 56 wherein the substrate is planar.

60. (New) The apparatus of claim 56 wherein the substrate is non-planar.

61. (New) The apparatus of claim 56 wherein the first and second sub-gratings are transmissive gratings.

62. (New) The apparatus of claim 56 wherein the first and second sub-gratings are reflective gratings.

63. (New) A system comprising:

an optical carrier source to generate first and second optical carriers;

first and second modulators to modulate a first data signal onto the first optical carrier and a second data signal onto the second optical carrier;

a first segmented diffraction coupled to the first and second modulators, the segmented diffraction grating comprising:

a substrate,

a first sub-grating formed on the substrate, the first sub-grating having a first grating period, and

a second sub-grating formed on the substrate parallel to the first sub-grating and separated from the first sub-grating by a selected non-zero distance, wherein the second sub-grating has a second grating period different than the first grating period;

an optical transport;

a second segmented diffraction grating coupled to the optical transport, the second segmented diffraction grating having substantially the same construction as the first segmented diffraction grating; and

first and second optical detector coupled to the second segmented diffraction grating.

64. (New) The system of claim 63 wherein the optical carrier source comprises a laser coupled to a beamsplitter.

65. (New) The system of claim 63 wherein the selected non-zero distance is positive.

66. (New) The system of claim 63 wherein the selected non-zero distance is negative, such that the first sub-grating and the second sub-grating overlap.

67. (New) The system of claim 63 wherein the substrate is planar.

68. (New) The system of claim 63 wherein the substrate is non-planar.

69. (New) The system of claim 63 wherein the first and second sub-gratings are transmissive gratings.

70. (New) The system of claim 63 wherein the first and second sub-gratings are reflective gratings.

71. (New) The system of claim 63 wherein the optical transport includes an optical fiber.

72. (New) A process comprising:

directing first and second optical signals onto a segmented diffraction grating formed on a substrate, the segmented diffraction grating comprising a first sub-grating and a second sub-grating;

diffracting the first optical signal with the first sub-grating, the first sub-grating having a first grating period; and

diffracting the second optical signal with the second sub-grating, the second sub-grating formed on the substrate parallel to the first sub-grating and separated from the first sub-grating by a selected distance, wherein the second sub-grating has a second

grating period different than the first grating period and a second amplitude different than the first amplitude.

73. (New) The process of claim 72 wherein the selected distance is positive.

74. (New) The process of claim 72 wherein the selected distance is negative, such that the first sub-grating and the second sub-grating overlap.

75. (New) The process of claim 72 wherein the selected distance is zero.

76. (New) The process of claim 72, further comprising routing the first and second optical signals into an optical carrier after diffraction by the first and second sub-gratings.

77. (New) The process of claim 76 wherein the optical carrier comprises an optical fiber.

78. (New) A process comprising:

directing first and second optical signals onto a segmented diffraction grating formed on a substrate, the segmented diffraction grating comprising a first sub-grating and a second sub-grating;

diffracting the first optical signal with the first sub-grating, the first sub-grating having a first grating period; and

diffracting the second optical signal with the second sub-grating, the second sub-grating formed on the substrate parallel to the first sub-grating and separated from the first sub-grating by a selected non-zero distance, wherein the second sub-grating has a second grating period different than the first grating period.

79. (New) The process of claim 78 wherein the selected distance is positive.

80. (New) The process of claim 78 wherein the selected distance is negative, such that the first sub-grating and the second sub-grating overlap.

81. (New) The process of claim 78, further comprising routing the first and second optical signals into an optical carrier after diffraction by the first and second sub-gratings.

82. (New) The process of claim 81 wherein the optical carrier comprises an optical fiber.